Metroplex-Wide Runway Configuration Management using COBRA (Configuration Optimization for Balanced Runway/Route Assignments) Tool, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

SSCI proposes to develop and test a Configuration Optimization for Balanced Runway/Route Assignments (COBRA) tool, which includes analysis and planner algorithms for optimizing runway selection and arrival/departure paths considering the neighboring airports in the metroplex that are competing for slots in the National Airspace System (NAS). Current practices are largely devised under the context of locally optimal planning, i.e. the plans are designed to yield as large a number of safe operations to a single airport during peak loads as possible. COBRA provides a semi-global look at the problem, considering that, periodically, what is best for a single airport may be not be the best plan for the system as a whole. During Phase I we will focus our efforts on 1) Formulating the Problem for a subset of Los Angeles metroplex, for which flight-data is available, 2) Algorithm development using a fast-time Evolutionary Algorithm (EA) to determine which routes provide the fewest conflicts and most efficient use of the terminal airspace, 3) Testing algorithms against Los Angeles metroplex scenarios, and 4) Providing thorough documentation of results. COBRA solutions will map flights to routes within a particular runway configuration and runway assignment. Another layer of the solver will review the nominal runway selection to determine if further balancing might be advantageous for surface operations. Designs will be flexible to incorporate a wide base of airportal constraints and objectives such as wind conditions, approved routes plans, airport surface geometry, and flight restrictions (e.g. noise abatements, separation requirements, etc.), and will be extensible to other metroplexes. Phase II work will seek to extend COBRA to a full metroplex, include uncertainty in the optimization, and test the algorithms against time-varying constraints.

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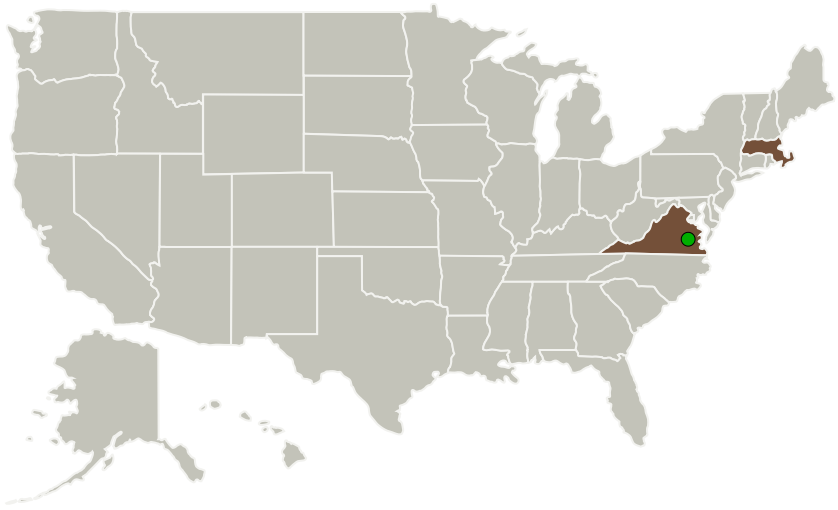
Completed Technology Project (2010 - 2010)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Scientific Systems Company, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Massachusetts	Virginia

Project Transitions

January 2010: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Scientific Systems Company, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jovan Boskovic

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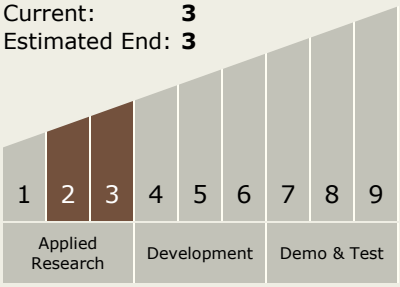
July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139213)*

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  - TX16.3 Traffic Management Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System